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## Beach Talk Yields Surprises

By SUSANNA SHEEHAN

Bulldozers on Duxbury beach creating artificial sand dunes with quarry sand? The beach narrowing and moving closer to the shoreline? Almost four tons of trash left on the beach after the summer season?

All of this seems almost unreal and impossible, but according to those who own and manage Duxbury Beach, keeping the beach sandy, clean and as we think of it in its summer state is a huge job that must be undertaken every year.

Speaking at the fourth "Duxbury Beach Education Night," on Wednesday, February 1, representatives from the beach's owners, Duxbury Beach Reservation Inc. and Batelle Oceanographic Institute explained the geology and maintenance aspects of what it takes to keep the beach open. The discussion was sponsored by the Beach Preservation Society, the fundraising arm of the

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Reservation and by Batelle of Washington St., an environmental studies organization headquartered in Columbus Ohio.

Jim O'Connell, a coastal geologist from Woods Hole, gave some interesting data on the four and a half mile long barrier beach. The beach's first function is "storm damage protection and flood control, which is very critical," O'Connell said. Without Duxbury Beach as a barrier, the shorefront homes on Duxbury Bay would be unprotected from the waters of the Atlantic Ocean.

However, the beach is narrowing and moving closer to land, said O'Connell. When the beach formed 3,500 years ago it was in a different location further, he said.

Using data provided by the federal government, which first started mapping the high-water mark of the beach in 1848, O'Connell said the beach has moved 313 feet landward from 1848 to 1994.

"It will continue to shift landward as a result of storms and overwash," said O'Connell, whose talk was accompanied with many slides illustrating his points.

He also had data to show how the beach is narrowing. In 1853, Duxbury beach was 290 feet wide near High Pines, its highest point. In 1951, it was 250 feet wide and in 1994, it measured 170 feet wide. O'Connell said the beach is narrowing due to the rising sea level and storms, but also "it's eroding from both sides."

And it's not your imagination that Duxbury Beach seems to be rockier than it used to be. It is. According to O'Connell, the major sources of sand for Duxbury Beach are the eroding shoreline and cliffs of Marshfield and Scituate, which have recently been shored up in many places with seawalls and concrete revetments. Sand from these areas used to wash away and travel down to be deposited by the sea on Duxbury Beach.

"We're the repository of what little sand is migrating out there, but they've choked off the primary sources of sand," said O'Connell. "There's not more cobble on the beach. There's less sand."

Duxbury beach is not wholly a natural beach anymore, said the town's conservation administrator Joe Grady, who plays a huge role in maintaining the beach. "It's an engineered structure," he said.

"Every year we truck in sand to rebuild the dunes," said O'Connell, adding that the beach trustees pay to have quarry sand brought in during the late winter and have made "sacrificial dunes" along the

front beach. In 2003, 5000 cubic yards of sand were trucked in and bulldozed into small mounds along the beach. After the October 1991 storm that devastated the beach, 80,000 cubic yards were brought in and another 120,000 cubic yards in 1994 after storms ravaged the beach that year.

The Reservation digs holes and removes the natural beach sand and then moves the quarry sand into these holes. Then it covers the disturbed area with a "veneer of beach sand," said O'Connell. The Reservation has to be very careful to make a 10:1 slope

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**—Jim O'Connell, coastal geologist**

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so the endangered piping plovers can pass over the new dunes.

Grady said the Reservation surveys the beach in December to decide which projects to undertake the next year. They must complete all beach maintenance by mid-March because that's when the piping plovers return to the beach to nest. This past year 12 pairs of plovers made 22 nests on the beach, but because of a late storm in May all the nests were wiped out.

This winter's windy rainstorms have battered Duxbury beach, said Grady. That means more installation of snow fencing and planting of more beach grass come April. Grady said that the Reservation replaced 35,000 feet of snow fence last year and 25,000 feet each year for the previous two years. They have also reinstalled 3,000 of the telephone poles that were bent out of position by the storms. On the first Saturday in April, volunteers will plant 12,000 stalks of beach grass. Grady is hoping for many volunteers this year because bad weather kept people away last year so only 6,000 stalks were planted.



"We very vigorously maintain the beach," said Grady, so if there is a significant storm, the federal government will reimburse the Reservation because the beach is an engineered structure.

The trucked-in sand and new snow fence and their related labor all cost the Reservation money. It leases the beach to the town for \$400,000, double the amount in 2004. Reservation Vice President Al Vautrinot said the Reservation has spent all its storm damage funds on maintaining the beach.

"Our budget is \$300,000 and it's gone now," he said.

Another part of the maintenance is fertilization of the beach grass and woody shrubs like *Rosa rugosa*, beach plums and poison ivy that were planted in the dunes on purpose to trap the sand eroded by the constant winds. Grady has fertilized the whole beach by hand for the past few years. This year, the Reservation received permission for a helicopter to fertilize the grass and shrubs on the dunes.

To further combat erosion, the Reservation is hoping that the federal government will allow dredge material from the dredging of Duxbury and Plymouth harbor to be dumped off the front beach between High Pines and Plum Hills so it will wash up on the beach. Vautrinot said the Army Corps of Engineers now dumps dredged material off of Wellfleet but that a huge

pipe can siphon the sand from the bottom of the shipping channel right to where it is needed on the beach.

"The more sand we get, the longer the beach is going to last," said Vautrinot. "The dredge material is compatible with the beach."

Other ideas Vautrinot has to keep the beach from losing any more ground is to build sacrificial dunes on the back side, create a salt marsh on the back side and to attach the snow fencing to the back of the poles instead of the front, so it will just break off and not take the poles with it.

Another part of maintaining the beach is keeping it clean. Dr. Bob Hillman, a research leader at Battelle, explained that there is a lot of trash left on Duxbury Beach at the end of a summer season and most of it is left by beachgoers.

Hillman said volunteers for an annual September beach sweep are given rubber gloves, trash bags and clipboards, and they record the amounts and types of trash they find on the beach.

The most trash ever found on the beach in one day was 7,890 lbs in 1991. Last year, 106 volunteers gathered 950 lbs, over half a ton, of trash on September 18, said Hillman.

He said data shows that most of trash is left on the beach by beachgoers and picnickers. Fifty-three percent of all the trash collected is the sort people leave behind — bags, balloons, bottles, cans, caps, lids, clothing, shoes and toys.

"When I looked at the data I was amazed and quite dismayed," he said. "We have to make people more aware."

The annual beach sweep is usually the third Saturday in September and anyone can volunteer.

At the end of the event, Don Gunster of Battelle presented a check for \$2,500 to the Reservation's storm damage fund.